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| 10/092,547 | 03/08/2002 | Hirotooshi Fukunaga | 2002-0323A | 8805 |

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EXAMINER

PHAN, THIEM D

| ART UNIT | PAPER NUMBER |
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3729

DATE MAILED: 04/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/092,547

Applicant(s)

FUKUNAGA ET AL

Examiner

Tim Phan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-12 and 14-23 is/are pending in the application.
- 4a) Of the above claim(s) 15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-12,14,18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendment filed in Paper No. 11 (filed 1/22/04) has been fully considered and made of record.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 7 and 8-14 are rejected under 35 U.S.C. 102(b) as being unpatentable over Mikio et al (JP09-237714) hereinafter '714 in view of Araki et al (US 5,676,998) hereinafter '998 or vice versa.

As applied to claims 1 and 3, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor (Cf. Detailed Description, Paragraph 1, line 3), including:

- forming hard magnetism layers Rx-By-TMz containing 10-20 at % (x = 0.1-0.2) R where R is selected from rare earth elements, 5-20 at % (y = 0.05-0.2) B (Boron) and remainder (z = 1-x-y) TM (Cf. Detailed Description, Paragraph 8, lines 1-3) at a thickness of thin or thick film of 0.01-300 micrometers (Cf. Applicants' disclosure, page 2, line 9) including

R2-TM14-B phase (Cf. Detailed Description, Paragraph 8, line 5) on a substrate (Cf. Fig. 1; Detailed Description, Paragraph 10, line 10) by physical deposition process such as using the bipolar magnetron-sputtering equipment (Cf. Detailed Description, Paragraph 13, line 1);

- heat treating the thick multilayer of rare earth film magnet R2-TM14-B (Cf. Detailed Description, Paragraph 12, lines 9 & 10).

The '998 teaches the magnet film deposition by laser ablation or abrasion (Cf. Fig. 3, element 16; column 5, line 25) in order to produce a magnet film with a high residual magnetization or coercive force.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying the laser abrasion process (as taught by the '998) in order to produce a magnet film with a high residual magnetization or coercive force.

As applied to claim 2, the '714 teaches the lamination of several layers of thick films into a multilayer (Cf. Fig. 1; Detailed Description, Paragraph 7, lines 1-3) on the substrate.

As applied to claim 4, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches a metal substrate of iron-cobalt alloy (Cf. column 8, lines 47-50; Table 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying the metal substrate of iron-cobalt alloy (as taught by the '998) in order to obtain a maximum energy product.

As applied to claim 7, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches a film deposition rate of 40 micrometer per hour (Cf. column 8, line 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying film deposition rate of 40 micrometers per hour (as taught by the '998) in order to speed up the lamination.

As applied to claim 8, the '714 teaches the vacuum pressure at forming the magnet film at 8×10^{-4} or less Pa (Cf. Detailed Description, Paragraph 13, line 3).

As applied to claim 9, the '714 teaches the heat treatment from 500 – 800 degrees C with larger coercive force at lower end temperature range (Cf. Detailed Description, Paragraph 18, lines 6-8).

As applied to claim 10, the '714 teaches the heat treatment. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply electric current for control-heating, since it was known in the art that the magnet film lamination is optimized at certain controlled temperature.

As applied to claims 11 and 12, the '714 teaches the lamination of multilayer of magnet films which are smoothly laid and pressed on top of each other while being heat-treated by electric current in the direction of thickness (CF. Fig. 1).

As applied to claims 13 and 14, the '714 teaches the claimed invention except for heat treating the lamination at a heating speed higher than 9 degree C per second, at a pressure of 200-400 kgf/ cm-square and a degree of vacuum of 1 Torr or less.

It would have been an obvious matter of design choice to heat-treat the lamination at a heating speed higher than 9 degree C per second, at a pressure of 200-400 kgf/ cm-square and a degree of vacuum of 1 Torr or less, since it was known in the art that the invention would perform equally well at a heat-treatment of 600 degrees C in 30 minutes and at a vacuum less than 1 Torr or Pa (Cf. Detailed Description, Paragraph 13, line 14).

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '998 and further view of Akioka et al (US 5,597,425) hereinafter '425.

The '714 and '998 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '425 teaches that the tantalum should be added to the rare earth film magnet (Cf. column 5, lines 3-5) in order to increase the coercive force or high residual magnetization.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by adding the tantalum (as taught by the '425) to the

rare earth film magnet or the substrate surface where rare earth film magnet is formed in order to increase the coercive force or high residual magnetization.

5. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '998 and further view of Bell et al (US 5,682,670) hereinafter '670.

As applied to claim 18, the '714 and '998 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations, including the magnet film deposition by laser ablation or abrasion (Cf. The '998, Fig. 3, element 16; column 5, line 25) comprising:

- forming hard magnetism layers $R_x-B_y-TM_z$ containing 10-20 at % ($x = 0.1-0.2$) R where R is selected from rare earth elements, 5-20 at % ($y = 0.05-0.2$) B (Boron) and remainder ($z = 1-x-y$) TM (Cf. Detailed Description, Paragraph 8, lines 1-3) at a thickness of thin or thick film of 0.01-300 micrometers (Cf. Applicants' disclosure, page 2, line 9) including R2-TM14-B phase (Cf. Detailed Description, Paragraph 8, line 5) on a substrate (Cf. Fig. 1; Detailed Description, Paragraph 10, line 10) by physical deposition process such as using the bipolar magnetron-sputtering equipment (Cf. Detailed Description, Paragraph 13, line 1);
- heat treating the thick multilayer of rare earth film magnet R2-TM14-B (Cf. Detailed Description, Paragraph 12, lines 9 & 10);
- building a lamination of rare earth film magnet into a motor (Cf. Detailed Description, Paragraph 1, line 3).

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The '670 teaches the process of magnetizing rare earth magnets for smaller motors (Cf. column 2, lines 9 and 42-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by applying the magnetizing process (as taught by the '670) in order to obtain the more complex magnetizing patterns in smaller motors.

As applied to claim 19, the '714 teaches the lamination of several layers into a multiplayer (Cf. Fig. 1; Detailed Description, Paragraph 7, lines 1-3) on the substrate.

As applied to claim 21, the '998 teaches a metal substrate of iron-cobalt alloy (Cf. column 8, lines 47-50; Table 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by applying the metal substrate of iron-cobalt alloy (as taught by the '998) in order to obtain a maximum energy product.

6. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '670 and further view of the '425.

The '714 and '670 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on applicants' claimed limitations.

The '425 teaches that the tantalum should be added to the rare earth film magnet (Cf. column 5, lines 3-5) in order to increase the coercive force or high residual magnetization.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by adding the tantalum (as taught by the '425) to the rare earth film magnet or the substrate surface where rare earth film magnet is formed in order to increase the coercive force or high residual magnetization.

Response to Arguments

7. Applicants' arguments filed 1/22/04 have been fully considered but they are not persuasive for the following reasons:

Applicants recite *inter alia* "...thick film of 30 to 100micrometers" or "thick film" (Cf. claims 1 & 18, lines 3 & 5; claims 2-11, 19, line 2; claim 12, line 3; Remarks, pages 10-13). The Patent Office's position, as stated in the preceding Action, was and continues to be that since the '741 teaches the deposition of rare earth film magnet of a thickness of 0.01 to 300 micrometers (Cf. Applicants' disclosure, page 2, line 9) with a range wide enough to cover applicant's limitation of 30 to 100 micrometers; "... laser abrasion process" (Cf. claims 1 & 18, line 4; Remarks, page 8 and 12), the '998 teaches the magnet film deposition by laser ablation or abrasion (Cf. Fig. 3, element 16; column 5, line 25) in order to produce a magnet film with a high residual magnetization or coercive force. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings (The '714 &

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'998) by applying the laser abrasion process (as taught by the '998) in order to produce a magnet film with a high residual magnetization or coercive force.

8. The remainders of the claims are rejected under 35 USC 103 of the current Office Action and in Responses to Remarks in paragraph 7 above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37-CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Phan whose telephone number is 703-605-0707. The examiner can normally be reached on Monday - Friday, 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter VO can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1148.



Tim Phan
Examiner
Art Unit 3729

tp
April 8, 2004



CARL J. ARBES
PRIMARY EXAMINER